General specifications of Super Bubbler WAC

- NDB-4, ver.1.1 -

- Anti static system for high-purity water -

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Contents

1. Purpose of System

High-purity water has a tendency to be charged with high potential / high voltage static electricity easily by friction of water and objects at the high pressure rinsing or the dicing process because of its high resistance. This charged static electricity causes some serious electrostatic harm. One of typical harm is a breakage of devices by its high voltage, and another is swarf sticking to the wafer surfaces by its electrostatic attraction at the dicing process. The best way to solve this problem is to discharge the built up static electricity by re-ionization of high-purity water. There are some ionization methods, although the injection of high-purity CO_2 gas is best because it is economical and safe for health. By this method, high-purity water would be conductive without de-grading; consequently it would not be charged with static electricity.

In CO_2 injection system, the most important thing is to control the rate of CO_2 injection exactly by the outlet resistivity, that is related between rate of CO_2 and resistivity in water. Too much injection of CO_2 makes water acid side, on the contrarily too little injection is not effective to prevent the electrostatic harms at all.

This system injects high-purity CO_2 gas through the precision injection device, and controls outlet resistivity accurately by the new concept control software.

The features are as follows.

a. Easy operation by the unique automatic control.

b. Quick response and high control accuracy.

c. Capacity of high water pressure and wide treated water flow rate.

d. Choice from rack type or cabinet type according as kind of the process.

2. Model

Trade name: Super Bubbler WAC

Model: NDB-4 Ver. 1.1

General name: Anti-static system for high-purity water.

3. Performance

Available set resistivity: **0.1-1.9M ohm cm at 25deg. C,**

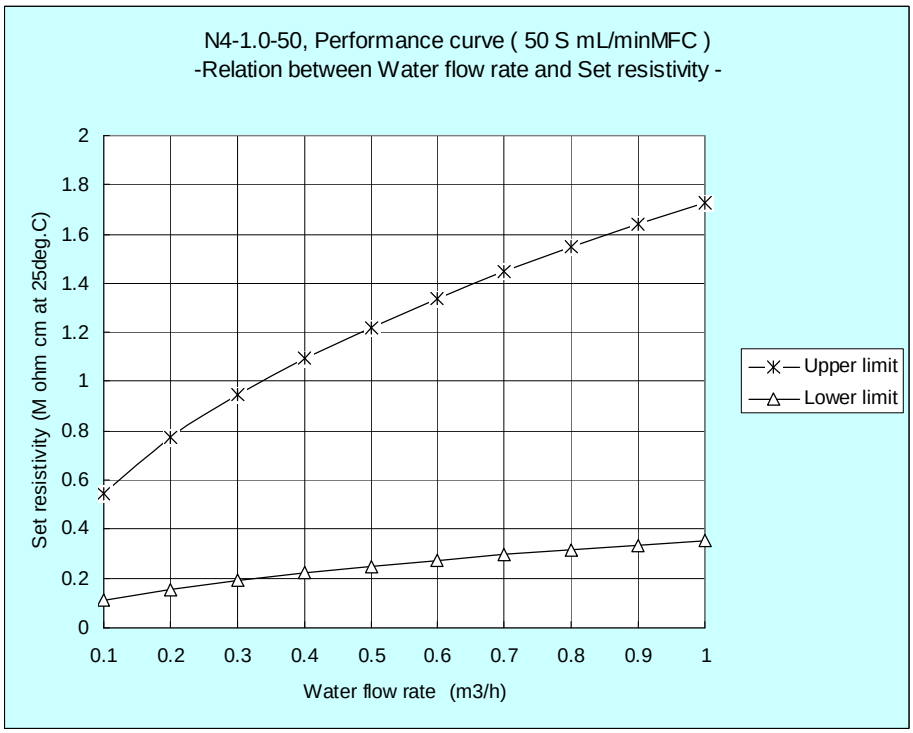
*This available set resistivity range depends on type.

*See following graph. Range of controllable resistivity is limited because the set resistivity has relation with the actual water flow rate. In treated water flow rate, the span between upper limit line and lower limit line is actual controllable range.

Treaded water flow rate: 100～1,000 (L/h), 200～2,000 (L/h), 300～3,000 (L/h)

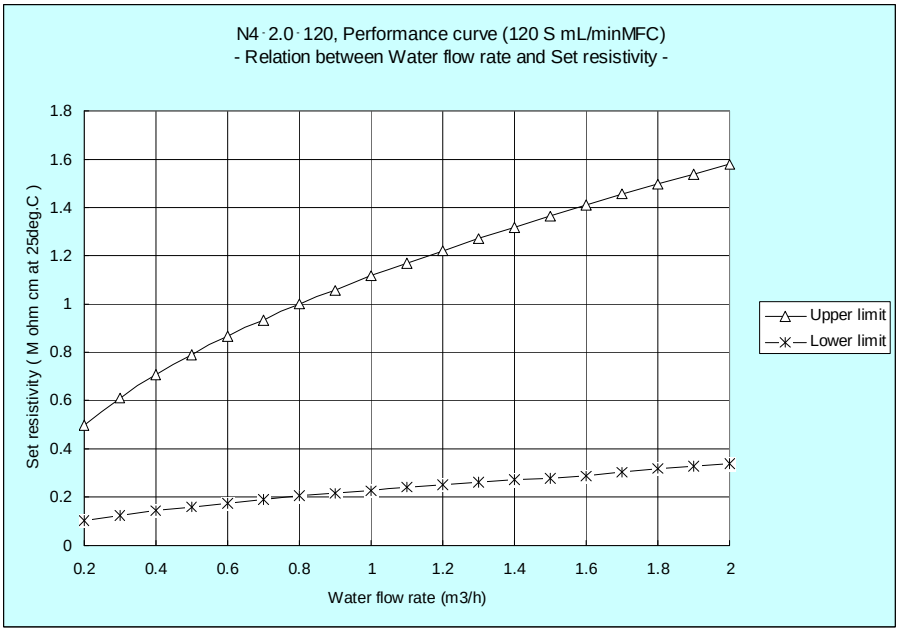
***See the selection sheet for the other types that are different in controllable range.**

a. Type N4-1.0-50, MFC range: 50 S mL/min, Water flow rate: 100 – 1000 L/h



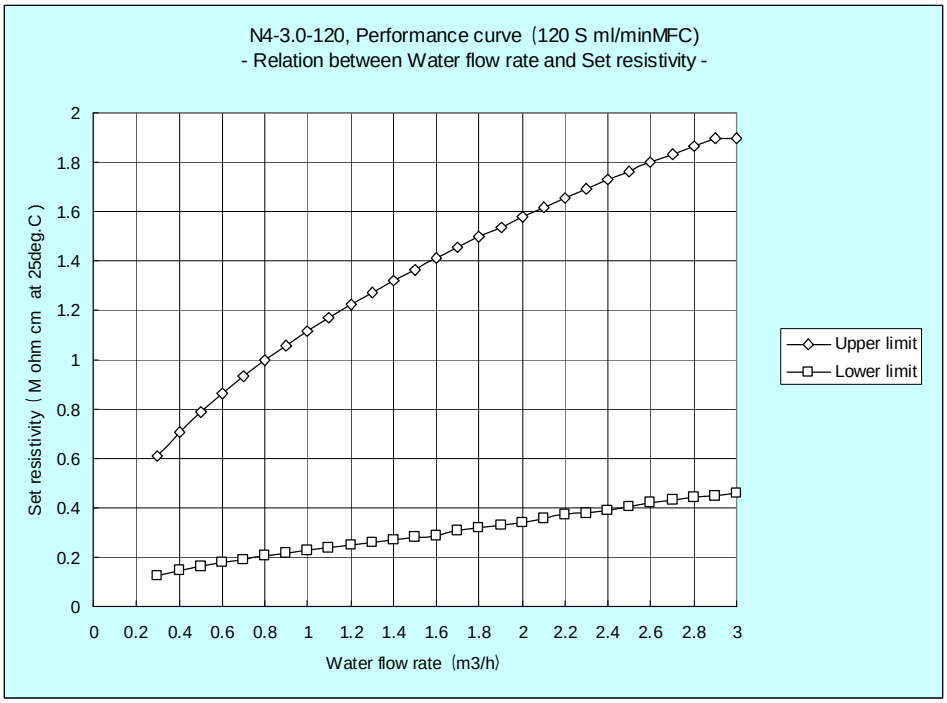
Graph-1

b. Type N4-2.0-120, MFC range: 120 S ml/min, Water flow rate: 200 – 2000 L/h



Graph-2

c. Type N4-3.0-120, MFC range: 120 S mL/min, Water flow rate: 300 – 3000 L/h



Graph-3

4. Specifications of Super Bubbler WAC

(1) Control accuracy: Set resistivity ± 1.5% / Percentage of full scale value 2.0MΩ cm

*Set resist.: 0.1-1.0 MΩ cm, water flow rate/water pressure/water temp. constant.

(2) Monitoring items/monitoring range.

Water flow rate ----------90-3000 L / h

Inlet water pressure----------0-1.0 MPa

CO_2 gas flow rate----------0-50, 120, 1200 S mL/min (MFC range depends on type)

*S mL/min: volume flow rate at 1atm and 20deg.C

CO_2 gas pressure----------0-1.0 MPa

Outlet resistivity (treated water)--0-2.0 MΩ cm at 25 deg.C.

(0-2.0 MΩ cm range)

(3) Maximum inlet water pressure----------0.5 Mpa

(4) Capacity for fluctuation of inlet water pressure----------Within ±0.05 MPa

(5) Maximum usage CO_2 gas pressure---------0.7 MPa

(6) Capacity to resist pressure----------0.7 MPa

(7) Safety valve set pressure of CO_2 regulator (Attached device)--------1.2 MPa

(8) CO_2 gas consumption--------0-50, 120, 1200 S mL/min (MFC range depends on type)

(9) Outside size, weight----------Rack type: 480W, 430L, 250H, and 28Kg

Cabinet type: 430W, 430L, 1350H, and 67Kg

*For details see another page.

(10) Standard for water line----------u-PVC(Clean pipe), 20A, JIS10K

(11) Connection size of water inlet and outlet----------Rc3/4

(12) Loss of water pressure----------Maximum 0.06 MPa at 3000 L / h

(13) Piping for CO_2 gas----------Outside 1/4", material SUS316, Swagelok

(14) CO_2 gas----------High-purity CO_2gas (recommended more than99.99%)

*CO_2 cylinder is not attached parts. Please prepare it by yourself.

(15) Style ----------Rack type: CO_2 gas line direct connection.

CO_2 cylinder 2set built-in (10L-volume, 7Kg-net weight)

(16) Specification of frame,

Material: Steel with baking paint, Colors: body 2.5Y8 / 2.0, control gear: N-3

(17) Terminals for recorder (control gear inside)--------Outlet resistivity (DC1-5V)

(18) Alarms-------Red lamp turns ON and buzzer ON at the alarming case as follows.

a) Press. low: Differential pressure low / Diff. Press. between CO_2 gas and inlet water. Red lamp and buzzer turns ON.

b) Resistivity high alarm: Outlet resistivity higher than the set point of resistivity monitor. Red lamp turns ON, and buzzer ON after the set time of delay timer.

c) Resistivity low alarm: Outlet resistivity lower than the set point of resistivity monitor. Red lamp turns ON, and buzzer ON after the set time of delay timer.

*Signal tower / Red, green is available as an option.

(19) Specifications of high-purity piping-----Size20A, Based on JISK6741 and JISK6743

(20) Specification of CO_2 gas piping--Swagelok type piping and connectors (SUS316,1/4)

(21) Specification of resistivity monitor.

Model / OE-960-CE, Maker / Cos Co.,Ltd., Indication style / digital indication.

Trace-ability / ±0.5%FS, Power source / DC24V, Safety regulation / CE marking.

(22) Specification of controller.

Model / SDC40B, Maker / Yamatake Co. Ltd,.

Indication style / digital indication, Input output signal / analog input-3,

Power source / DC24V 12W Max., Safety regulation / CE marking,

5. Required utilities, Working conditions.

(1) Electric power----------AC220-240V, 50 / 60Hz, single phase, 1A.
AC100-130V, 50 / 60Hz, single phase, 1A,

*Choice from two types, AC 100-130V type and AC220-240V type are different in the specification of the power cable.

(2) Case ground----------More than 0.9 mm^2 is set up in the control gear.

*Please connect the power cable of Super Bubbler WAC to your 3 lines connector that round line is connected to the ground plate firm.

(3) Maximum inlet water pressure----------0.5 MPa,

(4) Inlet water temperature----------20 – 30 deg. C.

(5) Fluctuation of inlet water pressure----------Within ±0.05 MPa

(6) Resistivity of inlet water----------More than16.0M ohm cm at 25 deg. C.

(7) Particles in inlet water----------Less than 200pcs./ ml

(Total number of bigger than 0.2 μm particles by the direct observation method)

(8) CO_2 cylinder capacity of container of cabinet type----10L-volume (7Kg / Net), 2sets,

*We cannot supply the CO_2 cylinder, please prepare it by yourself.

(9) Connection for water line -----Inlet and outlet / 3/4" Female screw,

(10) Connection of CO_2 gas line for rack type ----------swagelok 1/4"

(11) Surrounding temperature at operation----------0-50 deg. C.

* Working condition of the controller.

(12) Surrounding humidity at operation----------0-90% (Must be no condensation)

*Working condition of the controller.

(13) Surrounding temperature at transportation or storage----------0-70 deg. C.

(14) Surrounding humidity at transportation or storage----------0-90%

(Must be no condensation)

6. Inlet water pressure

6-1. Cautions,

Too big fluctuation of inlet water pressure may cause destruction of the system and unstable control. Please keep the specifications below.

a. Maximum inlet water pressure----------0.5MPa

b. Fluctuation of inlet water pressure----------within ± 0.05MPa, Exam: Fluctuation: 0.3 - 0.4MPa

c. Maximum inlet CO_2 gas pressure----------0.7Mpa

6-2. Ways to control inlet water pressure,

In fear of inlet water pressure rising more than 0.5MPa, please take following countermeasures against the pressure rising. However, it is unnecessary to take countermeasures in case that the water pressure is controlled accurately by the pressure control valve.

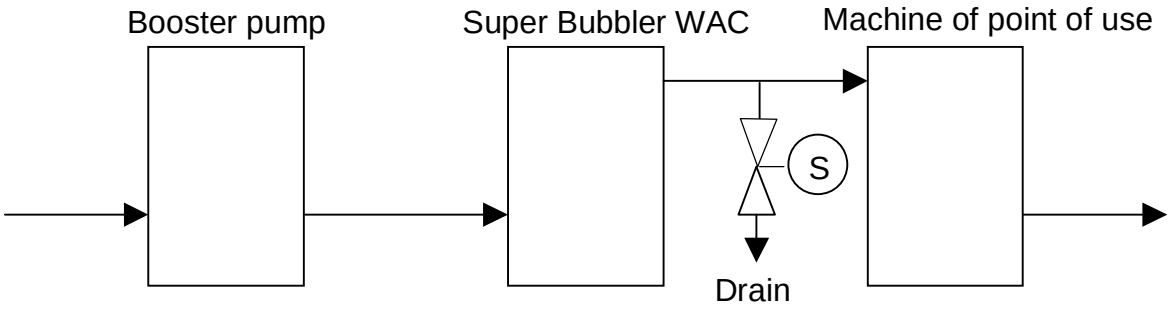
(1) Case of water flow rate completely stopped,

-Setting up of safety valve-

In case that inlet water flow rate stops completely (0 L/h) when the machine in point of use stops, please set the safety valve between Super Bubbler-WAC and the machine in point of use. To set the safety valve makes water pressure stable more, and the system will be safe.

Specifications are as follows.

Example: set pressure 0.5MPa (Variable setting), Size 20A-JIS10k, * S: Safety valve,

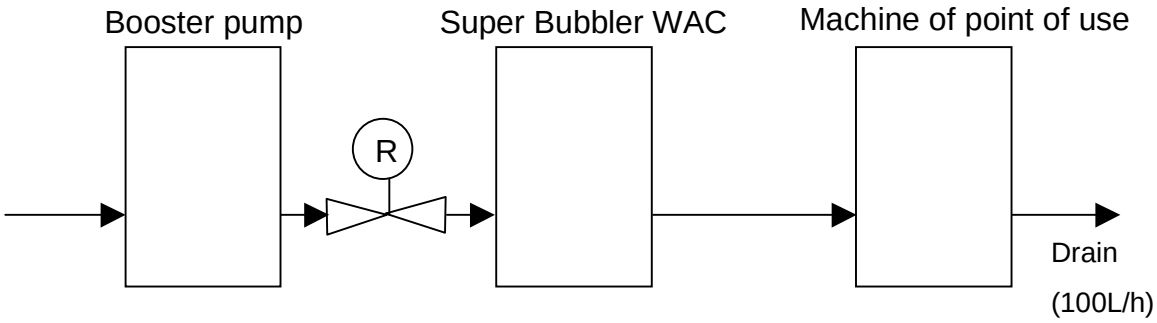


(2) Case of keeping minimum water flow kept continuously,

-Setting of water pressure regulator-

In case that minimum water is kept although the machine in point of use stops, to set water pressure regulator is effective. However, if the water flow rate is completely stopped, the outlet pressure of the water pressure regulator will be same as the inlet. In this case, it is necessary to set the safety valve between Super Bubbler-WAC and the machine in point of use. Example: set pressure 0.4MPa (Variable setting), Size 20A-JIS10k,

* R: Water pressure regulator,



7. Option

(1) Option for Rack type: CO_2 Regulator ----------FR-2S-OP (Heater-less)
CO_2 cylinder direct connection type, Maximum flow rate 1.0 L/min CO_2
*Cabinet type includes CO_2 regulator (FR-2S-P) with connector to CO_2 line.

(2) Alarm output signal, Run output signal-------Alarm output signal: One volt-free contact is utilizable, Run output signal: One volt-free contact is utilizable.

(3) Signal tower----------2 colors, green / run, red / alarm or malfunction.

8. Consumption parts

Filter cartridge for gas line: Replacement term / once per two years.

Model / SFB302-02 / 0.01μm, 1piece.

9. Controller and Control software

Control software is installed in the controller.

(1) Back up of data and program in the controller.

User customized data / design data and control data: EEPROM

Mode, local SP, output signal(A01), hold calculation: RAM backed up by super capacity condenser / capacity to back up for 24hours. .

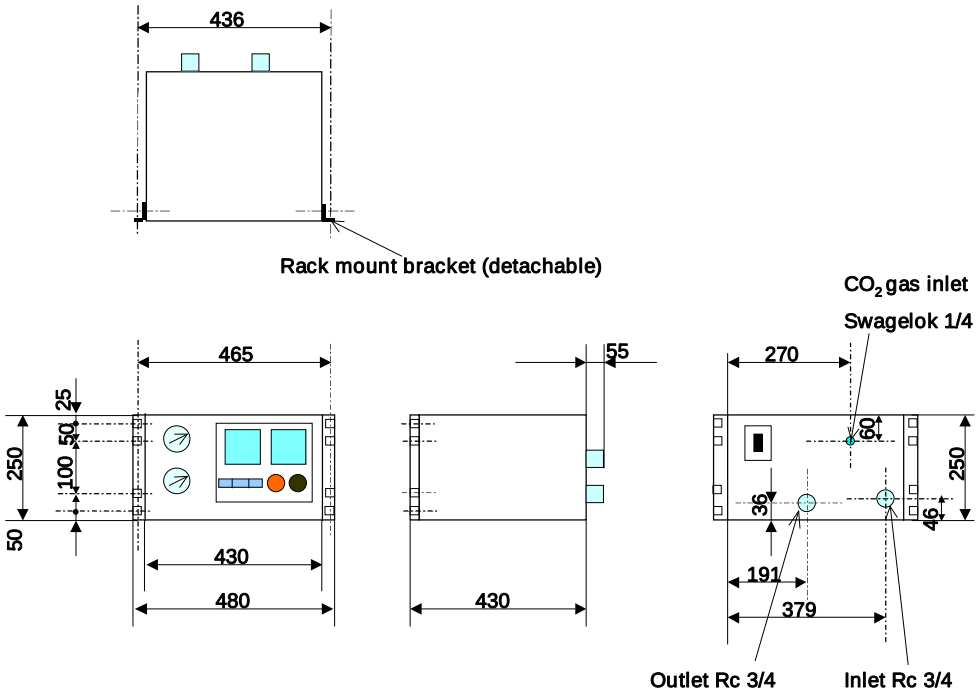
(2) Communication with controller and PC.

It is able to connect the communication port at front of the controller from PC by using the communication cable. For revision of the control software / application software, it is able to use the basic software for SDC40B installed in the PC.

10. Appearance and Weight

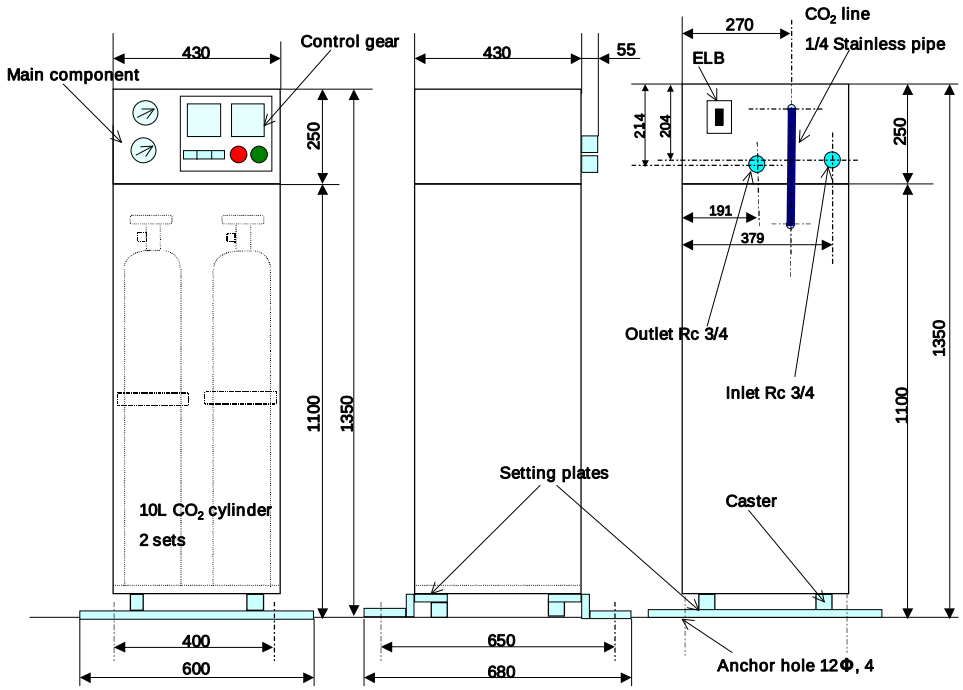
a. Dimensions of rack type,

Body weight：28 Kg



b. Dimensions of cabinet type,

Body weight：67 Kg (Not included CO_2 cylinder)



11. Flow diagram